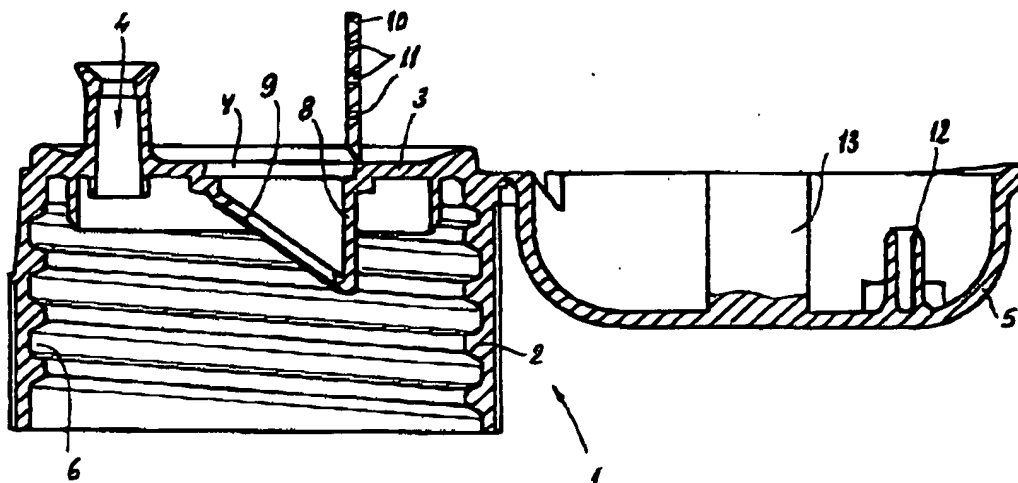


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(21) International Application Number: PCT/IB96/00745 (22) International Filing Date: 28 June 1996 (28.06.96) (30) Priority Data: 95/08327 5 July 1995 (05.07.95) FR (71) Applicant (for all designated States except US): ASTRA PLASTIQUE [FR/FR]; Boulevard Napoléon-Bullukian, Boîte postale 16, F-69830 Saint-Georges-de-Rencins (FR). (72) Inventors; and (75) Inventors/Applicants (for US only): DIDIER, Michel [FR/FR]; 8, rue Pierre-l'Homme, F-92400 Courbevois (FR). ODET, Philippe [FR/FR]; Route de Montluzin, F-69380 Chasselay (FR). (74) Agent: BROMILOW, David, John, English; Carnaudmetalbox plc, Downsview Road, Wantage, Oxfordshire OX12 9BP (GB).	(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: VENTING CLOSURE AND ITS MANUFACTURE



(57) Abstract

A venting closure (1) with a hinged cover (5) has a degassing device provided by a chimney (8) which extends inwardly from the end (3) of the body (2) of the cap. At its inner end the chimney is closed by an inclined semi-permeable membrane (9), whereas the outer end of the chimney, in the plane of the cap end (3), is permanently closed by a hinged lid (10) formed with vent holes (11). The lid (10) is moulded in one-piece with the cap. It is moulded open, and is closed in the mould at the same time as the cover is closed. For that purpose the cover has an inwardly extending rib (13) which engages it as the cover closes. The mould also has provision for cutting the membrane (9) from a parent strip, and for positioning it in the mould cavity prior to the injection of synthetic material.

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"VENTING CLOSURE AND ITS MANUFACTURE"

This invention relates to closure caps provided with degassing devices for venting, and to the manufacture of such caps.

Such a cap comprises a tubular body designed to
5 cooperate with the neck of a container, an end provided with an aperture allowing the product contained in the container to leave the latter, and a protective cover hinged on the body and having closing means arranged to cooperate with the aperture in the end of the cap.

10 It is known to provide such a cap with a degassing device for venting. The latter can be a valve which lets the gases enclosed inside the container pass when a certain overpressure prevails inside the latter.

Also known are degassing devices comprising a
15 membrane. The latter is permeable to gases, but impermeable to liquids. A second aperture is then provided in the end of the cap. The semi-permeable membrane separates this second opening from the inside of the container. Generally speaking, this membrane is
20 protected from the outside in that the second aperture is of reduced size or consists of a plurality of small holes.

The invention also concerns a process for
manufacturing a closure cap provided with a degassing
25 device, as well as an apparatus for using this process.

The main drawback of the known closure caps provided with a degassing device and of the known processes for manufacturing these caps is that it is necessary to attach the degassing device to a cap in order to realise
30 the final product. Because of this, the closure cap is manufactured on the one hand and the degassing device on

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the other hand, and the two sub-assemblies are assembled together in order to form the final product.

All these operations increase the cost price of a closure cap provided with a degassing device. In fact, two injection moulds and two injection stages, one for the cap and the other for the degassing device, as well as numerous manipulations of the intermediate components are necessary.

One aim of the present invention is therefore to propose a new closure cap incorporating a degassing device, as well as a process for manufacturing such a cap and an apparatus for performing the process, so that the degassing device may be formed integrally with the cap.

In accordance with the invention from a first aspect there is provided a closure cap made of synthetic material provided with a degassing device, which comprises a tubular body designed to cooperate with a neck of a container, an end provided with an aperture allowing the product contained in the container to leave the latter, and a protective cover hinged to the body and comprising closing means arranged for cooperation with the aperture, characterised in that

the end has:

a chimney extending, with respect to the end, on the same side as the body and closed by a semi-permeable membrane which is impermeable to liquids but permeable to gases,

a lid hinged in the plane of the end at one edge of the chimney and having at least one passage allowing gases to escape, and

means ensuring the maintenance of the lid in the closed position,

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and

the protective cover has, on its side facing the end, a rib designed to cooperate with the lid in order to close the latter at the time of the first closure of the protective cover.

This closure cap therefore comprises a degassing device integrated into its end. When the protective cover is closed, the liquid contained in the container cannot flow out, because the aperture permitting the outflow of the liquid is closed and the membrane closing the chimney is impermeable to liquids. However, the gases present in the container can escape by first of all passing through the membrane, then by being evacuated through the chimney and the passage provided in the lid.

In an advantageous embodiment, allowing a good closure of the lid, the base of the chimney at the end of the cap is in the form of a semi-circle which is oriented in such a way that the straight edge of the base is situated on the same side as the hinge between the end and the protective cover and is substantially parallel to this hinge, and the lid is hinged on the straight edge of the chimney.

Preferably, the lid is held in its closed position on the end of the cap by an irreversible latching. This makes it possible to ensure that the lid remains securely closed after its first closure.

In accordance with the invention from a second aspect there is provided a process for manufacturing a closure cap as defined above, characterised in that it comprises the following stages:-

- a) a membrane is cut from a strip of a semi-permeable material,

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- b) the cut membrane is placed in position in a mould in such a way that the membrane rests against a wall of the mould,
- c) the mould is closed,
- 5 d) a synthetic material is injected into the mould cavity, with confinement of the periphery of the membrane,
- e) the mould is opened after the injected material has cooled,
- 10 f) the protective cover of the cap thus moulded is closed and the lid is closed simultaneously, and
- g) the moulded cap is ejected from the mould.

Advantageously, one part of the mould has a central
15 core which is axially displaceable so as to cross the mould parting line, the central core forming the tool used for cutting the strip of semi-permeable material, and thereafter constituting an integral part of the mould during the injection of synthetic material.

20 This manner of proceeding avoids numerous manipulations of the membrane in order to realise its cutting and its transfer into the mould. Instead, a single manipulation is necessary.

The invention finally proposes an apparatus for use
25 of this process. This apparatus is of the type comprising a mould in at least two parts, a device for injection of synthetic material, a device for closing the protective cover of the closure cap, and a device for ejecting the moulded cap from the mould. According to
30 the invention, it comprises in addition a device for presenting a strip of semi-permeable material, and a tool for cutting the membrane from the strip.

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For increased speed and in order to minimise handling of the membrane during its cutting and transfer, one part of the mould comprises a central core which forms the tool for cutting the membrane and thereafter is axially displaceable, perpendicular to the mould parting line, to present the membrane in its desired position for moulding. Moreover, this central core comprises a device for holding the cut membrane in position, and acts to support the membrane in the course of the injection of synthetic material.

Finally, and advantageously, the device for closing the protective cover of the closure cap and the device for presenting the strip of semi-permeable material are mounted on the same support.

The invention will be understood better from the following description which is given, by way of example, with reference to the attached schematic drawings. The drawings show a closure cap according to the invention and a method and apparatus for its manufacture.

In the drawings:-

Fig.1 is a sectional view of the cap before its first closure;

Fig.2 is a similar view of the cap when closed;

Fig.3 is a top plan view of Fig.1;

Fig.4 represents in section and on a reduced scale a part of a mould capable of realising a cap such as is represented in the previous Figures;

Fig.5 is a cutaway view, on an enlarged scale compared with Fig.4, of this part of the mould in the closed position; and

Fig.6 represents a cap after its ejection from the mould.

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A closure cap is represented in Figures 1 and 2. It is designed to close a container (not shown). It comprises in a known way, a tubular body 2, an end 3, an aperture 4, and a protective cover 5 hinged to the body 2.

The tubular body 2 is of a circular-section, generally cylindrical shape. It has an internal thread 6 on its inside wall, so as to be able to be screwed on the neck of the container for which it is intended.

The end 3 has a first aperture 4 through which the product contained in the container can leave. The product can for example, be a housecare product. This opening 4 is placed near the edge of the end 3, close to the body 2 and on the side of the end opposite the hinge between the body 2 and the protective cover 5.

A second aperture 7 is formed in the end 3. It constitutes the base of a chimney 8 which extends perpendicularly to the end 3, on the same side of the latter as the body 2. This aperture 7 is in the form of a semi-circle, the straight edge of this semi-circle being situated on the side of the hinge between the body 2 and the protective cover 5 and lying parallel to this hinge, (see Fig.3).

The chimney 8 is closed at its end opposite the aperture 7 by a semi-permeable membrane 9 which is fixed onto the wall of the chimney. The membrane 9 is situated in a plane which is inclined with respect to the end 3.

The membrane 9 is made of a material which is permeable to gases, but impermeable to liquids, in particular to liquids destined to fill the container onto which the closure cap 1 is mounted. Such materials are well-known to the person skilled in the art.

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A lid 10 is attached by a film hinge at the edge of the second aperture 7, at the base of the chimney 8. This lid 10 is disposed on the straight side of the aperture 7, that is to say, on the same side of the aperture as the hinge between the body 2 and the protective cover 5. Its edge opposite its hinge is inclined slightly and in a complementary way to the corresponding edge of the aperture 7, so that the lid can latch onto the end 3.

Slots 11 of small cross section are provided in the lid for the passage of gases which are contained initially in the container and which from there permeate through the membrane 9.

The protective cover 5 comprises, in a manner known in itself, a teat 12 capable of cooperating with the first aperture 4 in order to close the latter tightly when the cover is closed, (see Fig.2). The engagement of the teat in the first aperture then serves to hold the cover in its closed position.

The protective cover 5 also has a rectangular rib 13. The latter, like the teat 12, is disposed on the face of the cover which is opposite to the end 3 in the closed position. This rib 13 is so placed that as the cover 13 being closed it engages the lid 10 and closes the latter. The lid then latches onto the end 3 and subsequently remains closed. It is therefore positively closed by the rib 13 at the time of the first closure of the cover.

Fig.5 represents an apparatus for the manufacture of a closure such as the one represented in Figures 1 and 2. This apparatus comprises a lower mould part 50, an upper mould part 51, a device for the injection of synthetic

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material 52 used for manufacturing the cap, a presentation device 53 for a strip of material 54 for forming the membrane 9, as well as a device 56 for closing the protective cover 5.

5 The lower part of the mould 50 is equipped with a device allowing the closure cap 1, once moulded, to be withdrawn outside the mould (50, 51). This part of the mould 50 is provided with a thread 57 of complementary shape to the internal thread 6 of the closure cap. This
10 thread 57 is formed on a cylindrical tubular core 58 which can be rotated by a drive device (not shown). Once the cap has been moulded, the tubular core 58 is unscrewed and the cap can then be ejected.

15 The lower part of the mould 50 can be moved towards and away from the upper part 51, which is fixed. The device for injection of synthetic material 52 is linked with the upper part of the mould 51.

20 The strip presentation device 53 and the device 56 for closing the protective cover are mounted on the same support 59 which is firmly connected to the lower part 50 of the mould. These two devices 53, 56 are interposed between the lower 50 and upper 51 parts of the mould when the latter are spaced apart.

25 The lower part of the mould 50 comprises a central core 55 which is axially displaceable. This central core 55 can transverse the mould parting line. Its free end is formed as a cutting tool capable of cutting the strip 54 filing past on the device 53 to form a membrane 9. This central core 55 is also coupled to a vacuum pump
30 (not represented) by a pipe 60 in such a way as to be able to hold the cut membrane 9 and to transfer it towards the lower part 50 of the mould. The mechanism

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allowing the movement of the core 55 has not been represented in the drawings. The free end of the core 55 is also designed to serve as a mould wall and support for the membrane 9 during the injection of synthetic material into the mould.

The process according to the invention for manufacturing a closure cap 1 such as for example the one represented in Figs. 1 and 2 is described below with reference to Figs. 4 to 6.

10 In Fig.4, the mould is open. The presentation device 53 is placed between the two parts 50, 51 of the mould, in such a way that the strip 54 is situated on the axis of the core 55. The mould is empty.

The central core 55 moves first of all towards the strip 54 and cuts this in order to form the membrane 9. By means of the pipe 60 connected to a vacuum pump, the membrane 9 is held at the end of the core 55. The latter then returns to the position drawn by a solid line in Figs. 4 to 6 in order to serve as a support to the cut membrane 9 and to constitute an integral part of the wall of the lower mould 50.

After withdrawal of the presentation device 53, the lower part of the mould 50 rises and rejoins the upper part 51 of the mould so as to close the mould cavity. Synthetic material is then injected. It can be seen from Fig.5 that the lower part of the mould 51 is arranged so that, with the exception of its edge, the membrane 9 is not covered with injected material. The temperature of the injected material of the edge is sufficient to ensure the bonding of the membrane 9 to the chimney 8. Fig.5 also shows that the lid 10 is moulded in the open position.

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When the injection is finished and the injected material has cooled, the mould is opened. The support 59, mounted on the lower part of the mould 60, advances towards the space left free between the two parts 50, 51 of the mould. The tubular core 58 carrying the thread 57 is rotated in order to release the closure cap 1, and the protective cover 5 leaves the lower part of the mould 50.

Once the protective cover 5 has left the mould, the closing device 56 closes it. This device 56 is mounted on the support 59 by means of a jack 61 (Fig.4), and its head is equipped with a small wheel 62.

The mould, in particular its lower part 50, and the device 56 for closing the protective cover are so disposed in relation to one another that, when the jack 61 moves the closing device 56 towards the closure cap 1, the small wheel 62 meets the protective cover 5 first of all. While continuing its movement, the device 56 closes the protective cover 5; thanks to the small wheel 62, there is no risk of any scratches being created on the cover.

During the closure of the protective cover 5, the rectangular rib 13 located inside it meets the lid 10. The rib 13 is shaped in such a way that, by the time that the protective cover 5 has been fully closed, the lid 10 has been latched onto the end 3 of the closure cap 1.

In this way the apparatus and process described above enable a closure cap 1 provided with a degassing device to be formed in a single injection - moulding operation and without necessitating multiple handling operations for its assembly.

The invention is not limited to the closure cap or process and apparatus for its manufacture particularly

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described, but should be considered to embrace all variants of the cap, process and apparatus.

Thus, for example, the slots formed in the lid can be replaced by one or more holes. The rectangular rib
5 can be replaced by a curved, semi-circular or even circular rib. The shape of the vent can be different from that shown, and can have, for example, a circular or polygonal cross section.

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CLAIMS:

1. Closure cap made of synthetic material provided with a degassing device, which comprises a tubular body (2) designed to cooperate with a neck of a container, an end (3) provided with an aperture (4) allowing the product contained in the container to leave the latter, and a protective cover (5) hinged to the body (2) and comprising closing means (12) arranged for cooperation with the aperture (4), characterised in that

the end (3) has:

a chimney (8) extending, with respect to the end (3), on the same side as the body (2) and closed by a semi-permeable membrane (9) which is impermeable to liquids but permeable to gases,

a lid (10) hinged in the plane of the end at one edge of the chimney (8) and having at least one passage allowing gases to escape, and

means ensuring the maintenance of the lid (10) in the closed position,
and

the protective cover (5) has, on its side facing the end (3), a rib (13) designed to cooperate with the lid (10) in order to close the latter at the time of the first closure of the protective cover (5).

2. Closure cap according to Claim 1, characterised in that the base of the chimney (8) at the end (3) of the cap is in the form of a semi-circle, having its straight edge disposed on the same side of the chimney as the hinge between the end (3) and the protective cover (5)

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and substantially parallel to that hinge, and in that the lid (10) is hinged on the straight edge of the chimney.

3. Closure cap according to Claim 1 or 2, characterised in that the lid (10) is held in its closed position on the end (3) of the cap by an irreversible latching.

4. Process for manufacturing a closure cap (1) according to any one of Claims 1 to 3, characterised in that it comprises the following stages:-

- a) a membrane (9) is cut from a strip (54) of a semi-permeable material,
 - b) the cut membrane (9) is placed in position in a mould (50,51) in such a way that the membrane rests against a wall of the mould,
 - c) the mould is closed,
 - d) a synthetic material is injected into the mould cavity, with confinement of the periphery of the membrane (9),
 - e) the mould is opened after the injected material has cooled,
 - f) the protective cover (5) of the cap (1) thus moulded is closed and the lid (10) is closed simultaneously,
- and
- g) the moulded cap is ejected from the mould.

5. Process according to Claim 4, characterised in that one part of the mould (50) comprises an axially displaceable central core (55) which is capable of crossing the mould parting line, the core forming the tool used for cutting the strip (54) of semi-permeable

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material, and thereafter moving in the opposite direction carrying along with it the cut membrane (9) until the latter occupies its place in the mould, the central core (55) then constituting an integral part of the mould during the injection of synthetic material into the mould cavity.

6. Apparatus for performing a process according to Claim 4 or Claim 5, which comprises a mould having at least two parts (50,51), a device (52) for injection of synthetic material into the mould cavity, a device (56) for closing the protective cover (5) of the closure cap, and a device for ejecting the moulded cap (1) from the mould, characterised in that it comprises in addition a device (53) for presenting a strip (54) of semi-permeable synthetic material, and a tool (55) for cutting the membrane (9) from the strip.

7. Apparatus according to Claim 6, characterised in that one part of the mould (50) comprises a central core (55) which forms the tool for cutting the membrane and has a means (60) for holding the cut membrane (9), the core being axially displaceable perpendicularly to the mould parting line to place the membrane in a desired position within the chimney (8), and thereafter serving as a mould wall supporting the membrane during the injection of synthetic material.

8. Apparatus according to Claim 6 or Claim 7, characterised in that the device (56) for closing the protective cover (5) of the closure cap and the device

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(53) for presenting the strip of semi-permeable material
are mounted on the same support (59).

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FIG 1

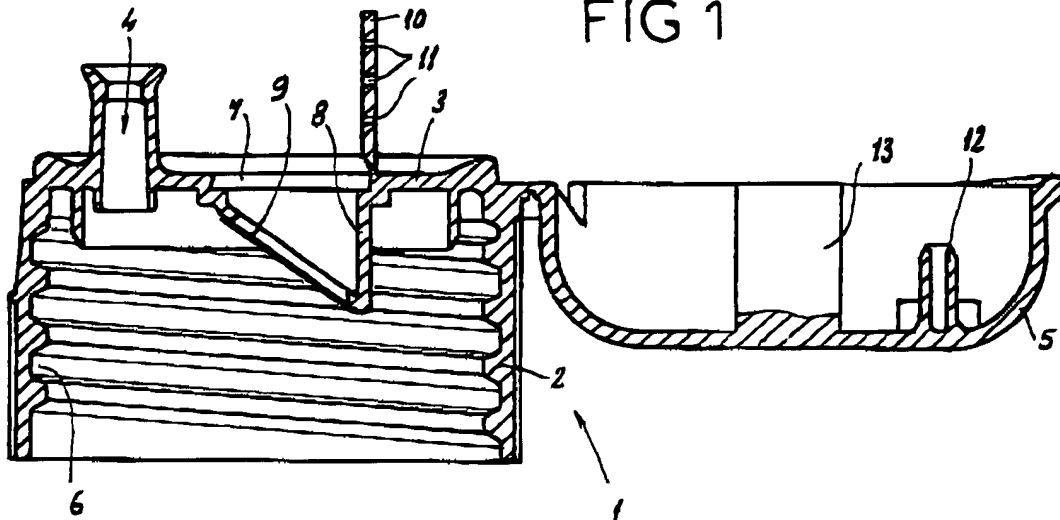
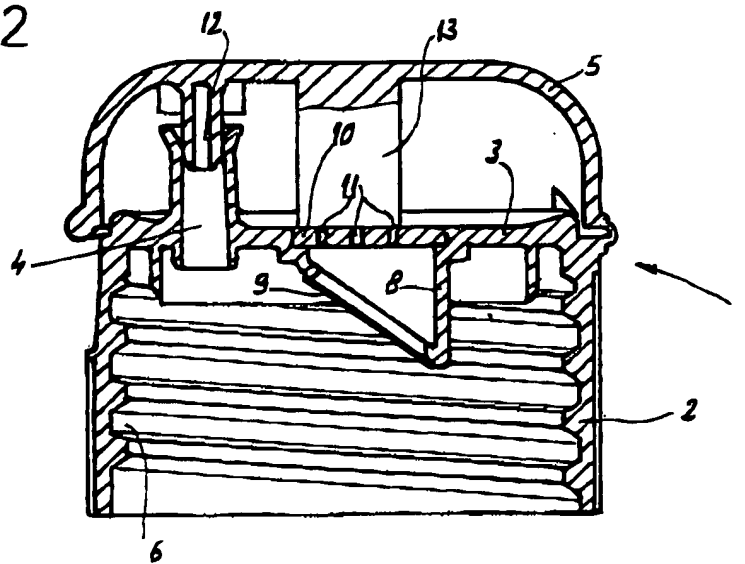


FIG 2

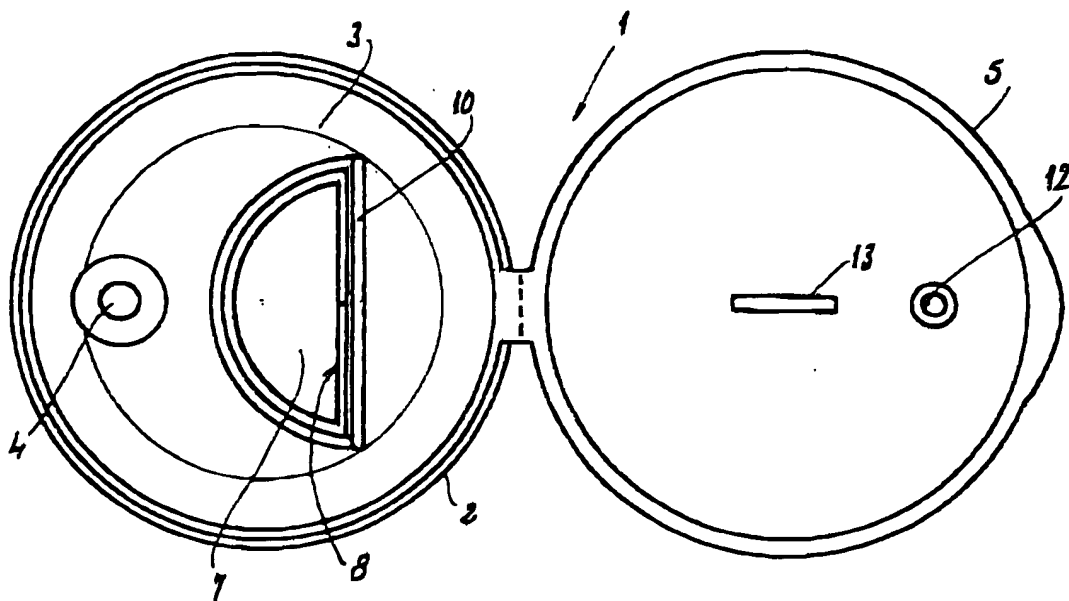


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FIG 3

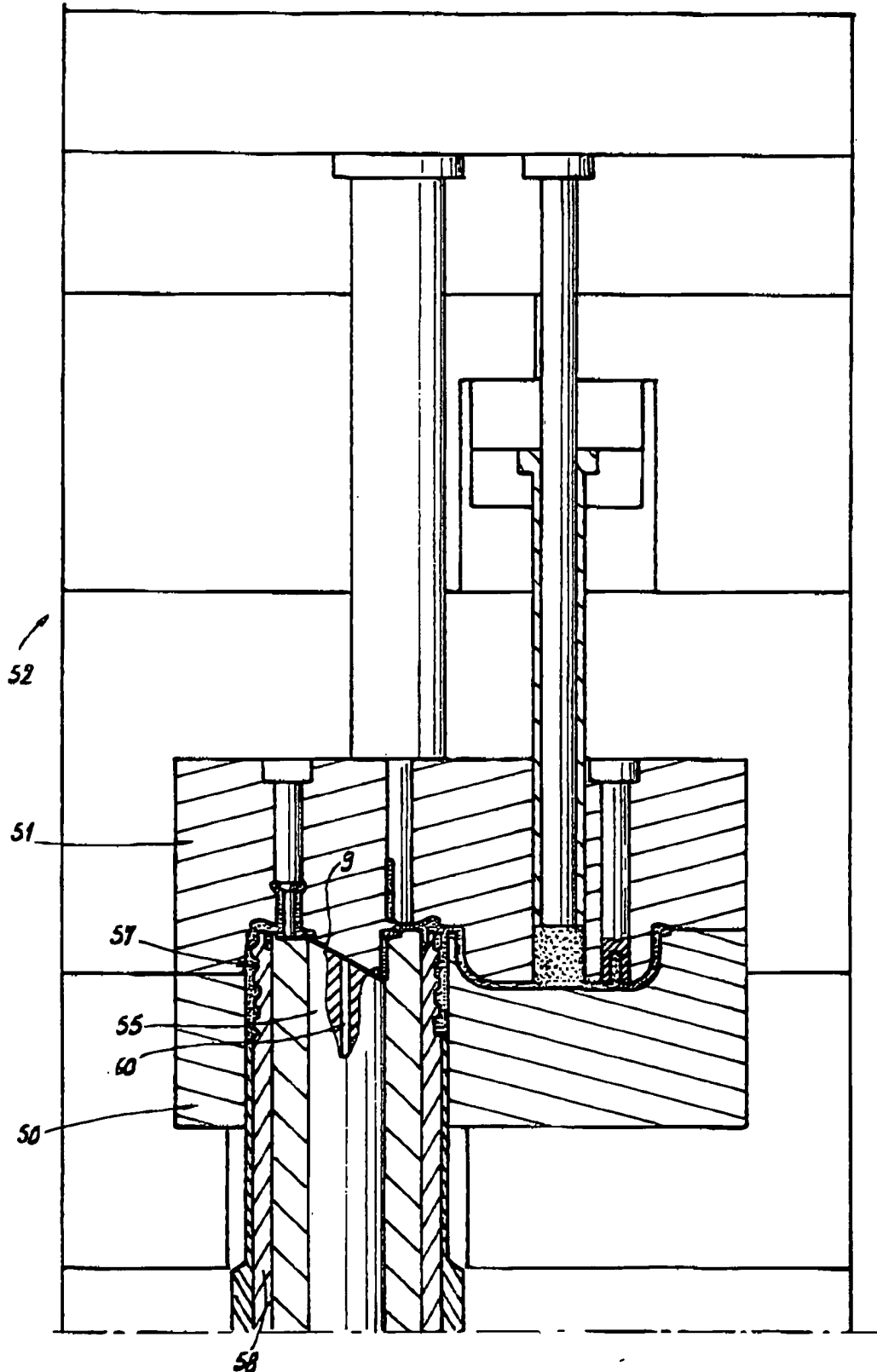


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FIG 5



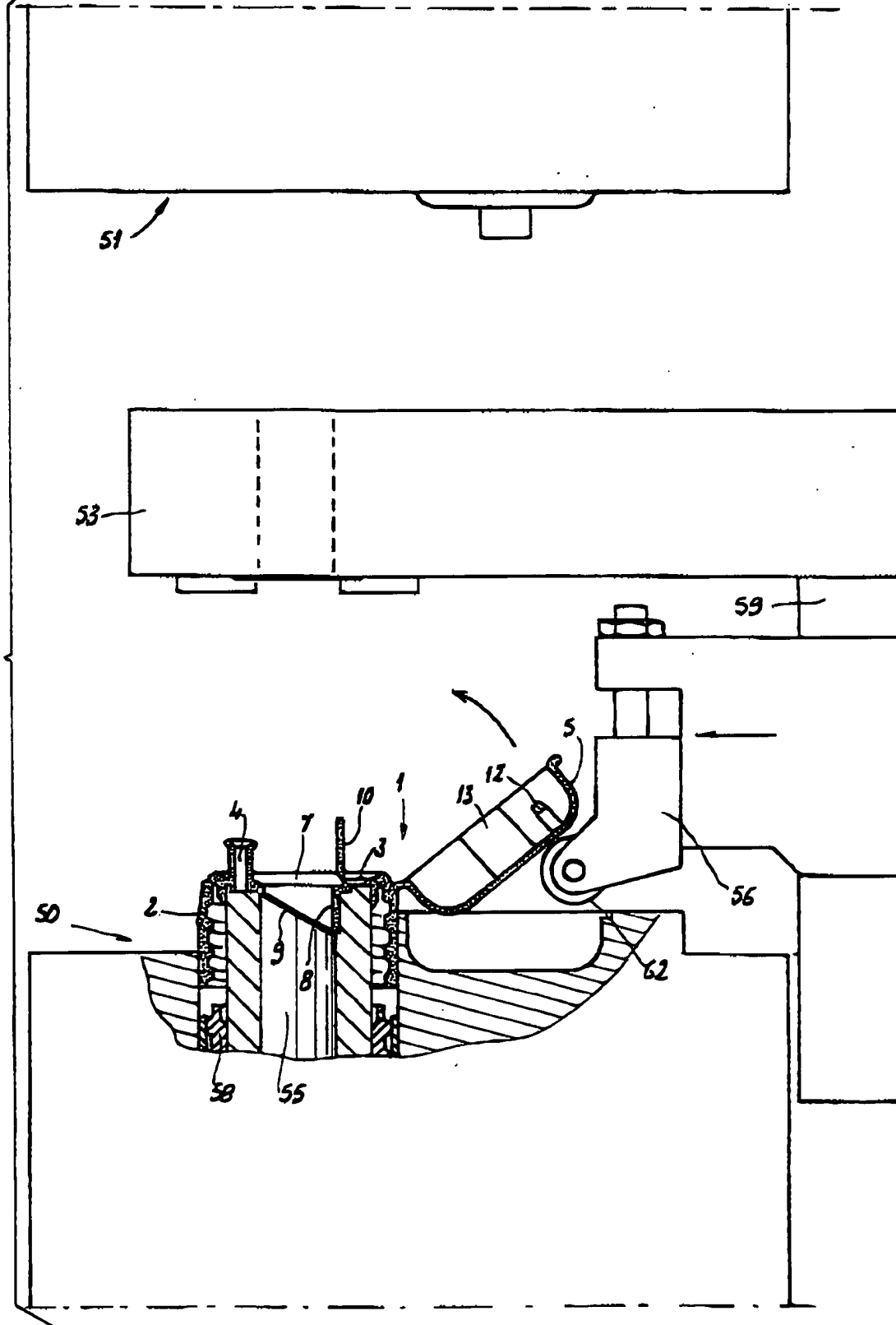
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FIG 6



INTERNATIONAL SEARCH REPORT

International Application No.

PCT/IB 96/08745

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D47/08 B65D51/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE,A,43 22 522 (HONASCO KUNSTSTOFFTECHNIK GMBH) 19 January 1995 see column 2, line 49 - column 4, line 23; figures 1,2	1,4,6
A	US,A,3 952 902 (PROUTY) 27 April 1976 see column 6, line 16-22; figures 1-9	1,4,6
A	WO,A,86 04856 (SCAMMELL) 28 August 1986 see page 6-11; figures 1-11	4,6

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Application No

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